Active Semiconductor Backplanes

This application is a continuation of US Application No. 09,868,229 filed 06/15/2001, now abandoned

The present invention relates to active semiconductor backplanes suitable for use with a spaced opposed substrate, commonly a counterelectrode, to form a cell, and to devices comprising such backplanes.

The device which is particularly described in this specification in connection with a preferred embodiment is a spatial light modulator in the form of a smectic liquid crystal layer disposed between an active semiconductor backplane and a common front electrode. It was developed in response to a requirement for a fast and, if possible, inexpensive, spatial light modulator comprising a relatively large number of pixels with potential application not only as a display device, but also for other forms of optical processing such as correlation and holographic switching. Our copending International Patent Applications even filing and priority dates (PCT/GB99/04285, ref: P20957WO, priority GB9827952.4; PCT/GB99/04286 and PCT/GB99/04276, refs: P20958WO and P20958WO1, both priority GB9827965.6; PCT/GB99/04282, ref: P20959WO, priority GB9827900.3; PCT/GB99/04274, ref: P20961WO, priority GB9827964.9; PCT/GB99/04275, ref: P20962WO, priority GB9827945.8; and PCT/GB99/04260 and PCT/GB99/04277, refs: P20963WO and P20963WO1, both priority GB 9827944.1) relate to other inventive aspects associated with the spatial light modulator.

During the course of development of the spatial modulator, a series of problems were encountered and dealt with, and the solutions to these problems (whether in the form of construction, function or method) are not necessarily restricted in application to the embodiment, but will find other uses. Thus not all of the aspects of the present invention are limited to liquid crystal devices, nor to spatial light modulators.

Nevertheless, it is useful to commence with a discussion of the problems encountered in developing the embodiment to be described later.

The liquid crystal phase has been recognised since the last century, and there were a few early attempts to utilise liquid crystal materials in light modulators, none of which gave rise to any significant successful commercial use. However, towards the end of the 1960's and in the 1970's, there was a renewed interest in the use of liquid crystal materials in light modulating, with increasing success as more materials, and purer materials became available, and as technology in general progressed.